

## CLAIMS

1 1. A computer-implemented method to support in developing a process  
2 specification for a collaborative process involving distributed computer-based  
3 participant systems exchanging messages through an asynchronous messaging  
4 network, the method embodied by a computer program product executable by a  
5 computer system and causing, when executed, said computer system to carry out  
6 the steps of:

7 retrieving from a first storage location, information on local states and local  
8 state transitions in relation to each participant system, said information specifying  
9 in relation to each local state transition, starting and target local states of the  
10 corresponding participant system and events triggering, and resulting from, the  
11 respective local state transition;

12 processing said information retrieved from said first storage location to  
13 generate, and store in a second storage location, information on collaboration  
14 states and collaboration state transitions of said process, said collaboration states  
15 defined by a local state for each participant system and a communication status of  
16 each message exchangeable between said participant systems, said collaboration  
17 state transitions being determined by applying said local state transitions to said  
18 collaboration states;

19 upon generation and storage of said information on said collaboration  
20 states and collaboration state transitions, retrieving that information from said  
21 second storage location;

22 processing said information retrieved from said second storage location to  
23 generate information on incompletely specified terminal collaboration states  
24 among said collaboration states, an incompletely specified terminal collaboration  
25 state being a terminal collaboration state in which at least one message is  
26 underway between said participant systems; and

27 generating a result data object containing information on every incompletely  
28 specified terminal collaboration state found.

1 2. The method of claim 1, further comprising the step of storing said result  
2 data object in a third storage location.

1 3. The method of claim 1 or 2, further comprising the step of providing said  
2 result data object to a graphical output device to visually present on a display a  
3 presentation object indicating every incompletely specified terminal collaboration  
4 state found.

1 4. The method of any of claims 1 to 3, wherein said communication status is a  
2 binary status indicating whether or not the respective message is underway  
3 between said participant systems.

1 5. The method of any of claims 1 to 4, wherein said step of processing said  
2 information retrieved from said first storage location includes generating, and  
3 storing in said second storage location, information on a set of virtual global states,  
4 said virtual global states being defined each by a local state for each participant  
5 system and a communication status of each message, said set of virtual global  
6 states comprising states of any combination of local states of said participant  
7 systems and communication statuses of said messages.

1 6. The method of claim 5, wherein said virtual global states are represented  
2 each by a global state vector composed of first global state vector elements  
3 indicating a local state for each participant system and one or more second global  
4 state vector elements, one in relation to each message, each second global state  
5 vector element indicating a communication status of the respective message, said  
6 set of virtual global states comprising states of any combination of values of said  
7 first and second global state vector elements.

1 7. The method of claim 5 or 6, wherein said step of processing said  
2 information retrieved from said first storage location includes identifying an initial  
3 global state among said virtual global states, said initial global state being one in  
4 which at least one local state transition as specified by said information retrieved  
5 from said first storage location and involving a local trigger is applicable to said

6 initial global state and no message is underway between said participant systems,  
7 said local state transition causing a global state transition from said initial global  
8 state to another virtual global state; determining every virtual global state  
9 reachable when starting from said initial global state; and determining said initial  
10 global state and every virtual global state reachable from said initial global state to  
11 be collaboration states.

1 8. A computer system to support in developing a process specification for a  
2 collaborative process involving distributed computer-based participant systems  
3 exchanging messages through an asynchronous messaging network, said  
4 computer system provided with a computer program product that, when executed,  
5 causes said computer system to carry out the steps of:

6 retrieving from a first storage location, information on local states and local  
7 state transitions in relation to each participant system, said information specifying  
8 in relation to each local state transition, starting and target local states of the  
9 corresponding participant system and events triggering, and resulting from, the  
10 respective local state transition;

11 processing said information retrieved from said first storage location to  
12 generate, and store in a second storage location, information on collaboration  
13 states and collaboration state transitions of said process, said collaboration states  
14 defined by a local state for each participant system and a communication status of  
15 each message exchangeable between said participant systems, said collaboration  
16 state transitions determined by applying said local state transitions to said  
17 collaboration states;

18 upon generation and storage of said information on said collaboration states  
19 and collaboration state transitions, retrieving that information from said second  
20 storage location;

21 processing said information retrieved from said second storage location to  
22 generate information on incompletely specified terminal collaboration states  
23 among said collaboration states, an incompletely specified terminal collaboration  
24 state being a terminal collaboration state in which at least one message is  
25 underway between said participant systems; and

26           generating a result data object containing information on every incompletely  
27 specified terminal collaboration state found.

1     9.     A computer program product providing computer-executable instructions  
2 that, when executed by a computer system, cause said computer system to carry  
3 out the steps of:

4           retrieving from a first storage location, information on local states and local  
5 state transitions in relation to each participant system, said information specifying  
6 in relation to each local state transition, starting and target local states of the  
7 corresponding participant system and events triggering, and resulting from, the  
8 respective local state transition;

9           processing said information retrieved from said first storage location to  
10 generate, and store in a second storage location, information on collaboration  
11 states and collaboration state transitions of said process, said collaboration states  
12 defined by a local state for each participant system and a communication status of  
13 each message exchangeable between said participant systems, said collaboration  
14 state transitions determined by applying said local state transitions to said  
15 collaboration states;

16          upon generation and storage of said information on said collaboration states  
17 and collaboration state transitions, retrieving that information from said second  
18 storage location;

19          processing said information retrieved from said second storage location to  
20 generate information on incompletely specified terminal collaboration states  
21 among said collaboration states, an incompletely specified terminal collaboration  
22 state being a terminal collaboration state in which at least one message is  
23 underway between said participant systems; and

24          generating a result data object containing information on every incompletely  
25 specified terminal collaboration state found.